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A WATER QUALITY STUDY OF THE ROCK CREEK WATERSHED

Johan A. Aalto, et al

Federal Water Pollution Control Administration
Charlottesville, Virginia

March 1969

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March 1969

Johan A. Aalto,

Norbert A. Jaworski,

and

William H. Schremp

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FWPCA

Middle Atlantic Region
Federal Water Pollution Control Administration
U. S. Department of the Interior

TABLE OF CONTENTS

		Page
I.	PREFACE	I - 1
II.	INTRODUCTION	II - 1
	A. Purpose and Scope	II - 2
	B. Authority	II - 3
	C. Acknowledgments	II - 3
III.	SUMMARY AND CONCLUSION	III - 1
IV.	WATER AND LAND RESOURCES	IV - 1
	A. General Description	IV - 1
	B. Hydrology	IV - 2
	C. Impoundments	IV - 2
	D. Recreational Areas and Parks	IV - 3
	1. District of Columbia	IV - 3
	2. Montgomery County	IV - 6
	E. Fishing	IV - 6
V.	WATER QUALITY STANDARDS	V - 1
	A. State of Maryland	V - 1
	B. District of Columbia	V - 3
VI.	WASTEWATER CONVEYANCE AND DISPOSAL	VI - 1
	A. Sewer Systems in the District of Columbia	VI - 1
	B. Sewer Systems in Montgomery County, Maryland	VI - 3
VII.	WATER QUALITY	VII - 1
	A. Biochemical Oxygen Demand and DO	VII - 1

TABLE OF CONTENTS (Continued)

		Page
	1. Historical Trends	VII - 1
	2. Spatial Distribution	VII - 2
B.	Bacteriological	VII - 4
C.	Nutrients	VII - 8
D.	Suspended Solids (Sediments)	VII -13
E.	Surfactants	VII -15
F.	Biological Life	VII -17
VIII.	POLLUTION ABATEMENT ACTIVITIES AND PROGRAMS	VIII - 1
A.	Wastewater Conveyance and Disposal	VIII - 1
	1. District of Columbia	VIII - 1
	2. National Zoological Park	VIII - 3
	3. Montgomery County	VIII - 4
B.	Debris Removal and General Sanitation	VIII - 5
C.	Sediment Control Program	VIII - 5
D.	Research and Development Programs	VIII - 8
IX.	BIBLIOGRAPHY	IX - 1

LIST OF TABLES

Table		Page
IV - 1	Rock Creek Impoundments	IV - 2
IV - 2	Cost Allocation and Cost Sharing Summary.	IV - 4
IV - 3	Annual Population Use of Rock Creek Park	IV - 5
VI - 1	Sanitary Sewerage Systems of the District of Columbia	VI - 2
VI - 2	District of Columbia Sewered Areas.	VI - 3
VII - 1	Summary of Average Monthly DO Concentrations. . .	VII - 3
VII - 2	Water Quality Reconnaissance.	VII - 5
VII - 3	Rock Creek Water Quality Survey, September 1968 .	VII - 6
VII - 4	Water Quality Data, April 1968.	VII - 7
VII - 5	Rock Creek Survey, August 1967.	VII - 9
VII - 6	Summary of Bacteriological Data	VII -11
VII - 7	Summary of Nutrient Data.	VII -12
VII - 8	Average Monthly Suspended Solids Loadings	VII -14
VII - 9	Surfactant Analyses of Rock Creek	VII -16
VIII - 1	District of Columbia Sewered Areas.	VII - 2

LIST OF FIGURES

Figure		Following Page
IV - 1	Rock Creek Watershed	IV - 1
IV - 2	Rock Creek Park - Washington, D. C.	IV - 5
IV - 3	Rock Creek Park, Montgomery County	IV - 7
VII - 1	Sampling Station Locations	VII - 1
VII - 2	Trends of BOD.	VII - 1
VII - 3	Coliform Trends.	VII - 4
VII - 4	Fecal Coliform Densities	VII - 8
VII - 5	Suspended Solids	VII -15

CHAPTER I

PREFACE

Urban streams and their valleys are major landscape features in many populated areas. These urban streams are aesthetically pleasing natural environments and often are incorporated into the environmental design as recreation areas and parks. With the every increasing development of our urban areas, water resources management problems, such as flashy streams, high sediment loadings, and high coliform densities, also increase.

The preservation and improvement of urban streams are predicated on sound planning and cooperation between the various land users. This is especially so in Rock Creek, an urban stream which empties into the Potomac River within the City of Washington, D. C. Flowing within two miles of our Nation's Capitol, the waters and valleys of Rock Creek are an integral part of the country's heritage.

The approaches to water quality management used in waters degraded by readily identified discharges, as from wastewater treatment plants, are not adequate for urban streams such as Rock Creek.

CHAPTER II

INTRODUCTION

At the request of Secretary of the Interior Stewart Udall on July 3, 1966, the Federal Water Pollution Control Administration (FWPCA) initiated an investigation of the water quality problems in the Rock Creek watershed, a sub-basin of the Potomac River, to develop a program of corrective measures to permit recreational use of the waters of Rock Creek. It was the expressed desire of the Secretary that recreational use of Rock Creek would be possible by October 1967. A preliminary report, "Summary of Water Quality and Waste Outfalls,"[1] was prepared by the Middle Atlantic Region (MAR) of FWPCA in December of 1966 delineating the water quality problem areas and possible sources of pollution.

In February of 1967, the Department of the Interior published a special report to the Nation on the problems and suggested corrective action for Rock Creek entitled "The Creek and the City."[2] The two specific steps recommended to clean up, restore, and preserve Rock Creek were first, immediate measures to eliminate sources of pollution and deterioration susceptible to quick and decisive action and second, vigorous research and planning towards the complete understanding and eradication of the deep-rooted problems related to urban runoff.

As part of the winter meeting of the Interstate Commission on the Potomac River (INCOPOT), a public meeting co-sponsored by the Rock Creek Watershed Association was held in Gaithersburg, Maryland,

on February 16, 1967. At the meeting, excerpts from the Department of the Interior report, statements of agencies with responsibilities, and statements of agencies with other responsibilities were presented.

A. Purpose and Scope

As part of the Chesapeake Bay-Susquehanna River Basin Project, the Chesapeake Field Station (CFS) of the Middle Atlantic Region of FWPCA has undertaken a water quality management study of the entire Potomac River Basin. An important part of this overall study related to the July 3, 1966 request of the Secretary of the Interior.

Since 1966, investigations of the water quality and related problems in the Rock Creek watershed have been continued by CFS and other Federal and State agencies. Also since 1966, corrective actions have been carried out by various agencies in the watershed.

The purposes of this report are:

1. To provide information on:
   a. The existing water quality in Rock Creek
   b. The status of corrective programs for water quality management and
   c. The general conditions within the watershed.
2. To determine if any significant changes have occurred in water quality as a result of the corrective action programs.
3. To publish all water quality field survey data collected by CFS and others since 1966.

B. Authority

This survey was conducted and the report prepared under the provisions of the Federal Water Pollution Control Act as amended (33 U.S.C. 466 et seq.) which directs the Secretary of the Interior to prepare or develop programs for eliminating or reducing the pollution of interstate waters and tributaries thereof and improving the sanitary condition of surface and underground waters, in cooperation with State water pollution control agencies and with the municipalities and industries involved.

C. Acknowledgments

The cooperation of the following agencies in providing information assisted appreciably in the preparation of this report:

Maryland-National Capital Park and Planning Commission

Maryland State Department of Health

Maryland State Department of Water Resources

D. C. Department of Sanitary Engineering

D. C. Department of Public Health

U. S. Geological Survey

Washington Suburban Sanitary Commission

National Park Service

Montgomery County Department of Health

U. S. Department of Agriculture, Soil Conservation Service

CHAPTER III

SUMMARY AND CONCLUSIONS

Since 1966, when considerable public interest was focused on the conditions in Rock Creek, continuing investigations have supplemented the original findings in further defining the problems of the watershed, implementing the corrective programs, and investigating alternative methods for pollution control as described in the report, "The Creek and the City." Existing environmental conditions including water quality and recent pollution abatement efforts are presented below:

1. The principal water uses of Rock Creek are to provide for an aesthetically pleasing natural environment, water contact recreation and fish propagation.

2. It is anticipated that annual use of the recreational facilities in Rock Creek watershed will increase from 3,300,000 people in 1960 to over 9,600,000 by 1980.[4/]

3. As part of an Upper Rock Creek Watershed Development Plan, two multipurpose impoundments have been constructed, initially for flood and sediment control. Recently, recreational developments have been incorporated into the plan.

4. Water quality standards and implementation plans for the inter- and intrastate waters of Rock Creek were adopted and approved by the U. S. Department of the Interior for the State of Maryland in 1967 and for the District of Columbia in 1968.

5. The sanitary wastewater of the watershed is conveyed to the District of Columbia Water Pollution Control Plant at Blue Plains by interconnected sewerage systems in Montgomery County, Maryland, and the District of Columbia. In Montgomery County, the conveyance is via a separate sewerage system while in the District of Columbia, by both separate and combined systems.

6. Water quality survey data indicated that:

a. Generally throughout the waters of the basin, dissolved oxygen levels are above the minimum standard of 5.0 mg/l with a corresponding biochemical oxygen demand concentration of 1 to 3 mg/l.

b. There is no significant increase or decrease in biochemical oxygen demand (BOD) or dissolved oxygen (DO) between the District line and the confluence with the Potomac River. There appears to be no significant change from 1960 to 1967.

c. Extremely high coliform densities with monthly means ranging between 10,000 to 100,000 MPN/100 ml, have been routinely observed in Rock Creek at the District Line.

d. While the coliform densities within the District of Columbia are slightly higher than in Maryland due to the periodic overflowing of the combined sewerage system, high coliform densities have also been observed in the upper portions of the basin in Montgomery County where the sewers are separated.

e. In general, the maximum fecal coliform standards of 200 MPN/100 ml in the District of Columbia and 240 MPN/100 ml in Maryland are being exceeded.

f. High concentrations of suspended matter, often over 100 mg/l, have also been routinely observed in Rock Creek at the District Line. These high concentrations are a result of erosion in the upper portions of the watershed during the periods of high runoff.

g. Biological investigation of bottom organisms in Rock Creek indicates a better aquatic environment in the upper portion of the basin than in the lower.

7. Sewer inspection and maintenance programs have been intensified by both the Department of Sanitary Engineering in the District of Columbia and the Washington Suburban Sanitary Commission in Montgomery County. Vandalism appears to be one of the major causes of failures in the sewerage systems.

8. Pollution control projects at the National Zoological Park are now about 80 percent completed and wastewater from the Zoo is no longer a major source of pollution to Rock Creek.

9. Within 25 months, the construction of the remaining portion of the Potomac River force mains is expected to be completed. These new sewers will considerably reduce overflowing of the combined sewers in the lower portion of Rock Creek.

10. Since 1957, the acreage served by separated sewers in the District of Columbia has been increased 14 percent, from 3,757 to 4,840 acres.

11. Debris removal by the U. S. Park Service during the summer of 1968 enhances the appearance of the creek area within the District of Columbia. A general sanitation program was also maintained in the park area of Montgomery County by the Maryland National Capital Park and Planning Commission.

12. Sediment control in the watershed is being instituted by three distinct methods:

a. A compulsory program for soil erosion control in Montgomery County, particularly in the developing areas of the county,

b. operation of the two recently completed headwater impoundments as sediment traps, and

c. the use of polymers to settle out sediment above one of the impoundments.

Included is a ten-year study currently being conducted by the Soil Conservation Service to evaluate various aspects of sediment control.

13. Research and development efforts are currently being supported by the FWPCA:

a. to continue studies using polymers for sediment control and

b. to evaluate methods of abating pollution from combined sewer discharges.

From an analysis of the water quality data, it appears that the two principal problems are high coliform densities and high suspended solids concentrations resulting mainly from urban and agri-

cultural runoff. While it appears possible to control over 50 percent of sediment by the various methods being demonstrated, the reduction of coliform densities by these methods is difficult to predict.

With the ever increasing development of the upper portion of the watershed and the projected increase in park development, an associated increase in coliform densities is anticipated. Moreover, it appears that it will be difficult to maintain a fecal coliform density at or below the adopted standards if there is no improvement in current sanitation practices.

There are two principal problems in maintaining low fecal coliform densities: (1) the treatment or transport of controlled storm water runoff from urban areas and (2) the treatment of uncontrolled runoff from both urban and rural areas. Since the maintenance of good water quality in urban streams has only recently been of concern, very little attention has been given to the problem historically.

The studies currently being sponsored by the FWPCA and the Soil Conservation Service should provide a much needed insight as to feasible methods and costs of maintaining good water quality in urban streams.

CHAPTER IV

WATER AND LAND RESOURCES

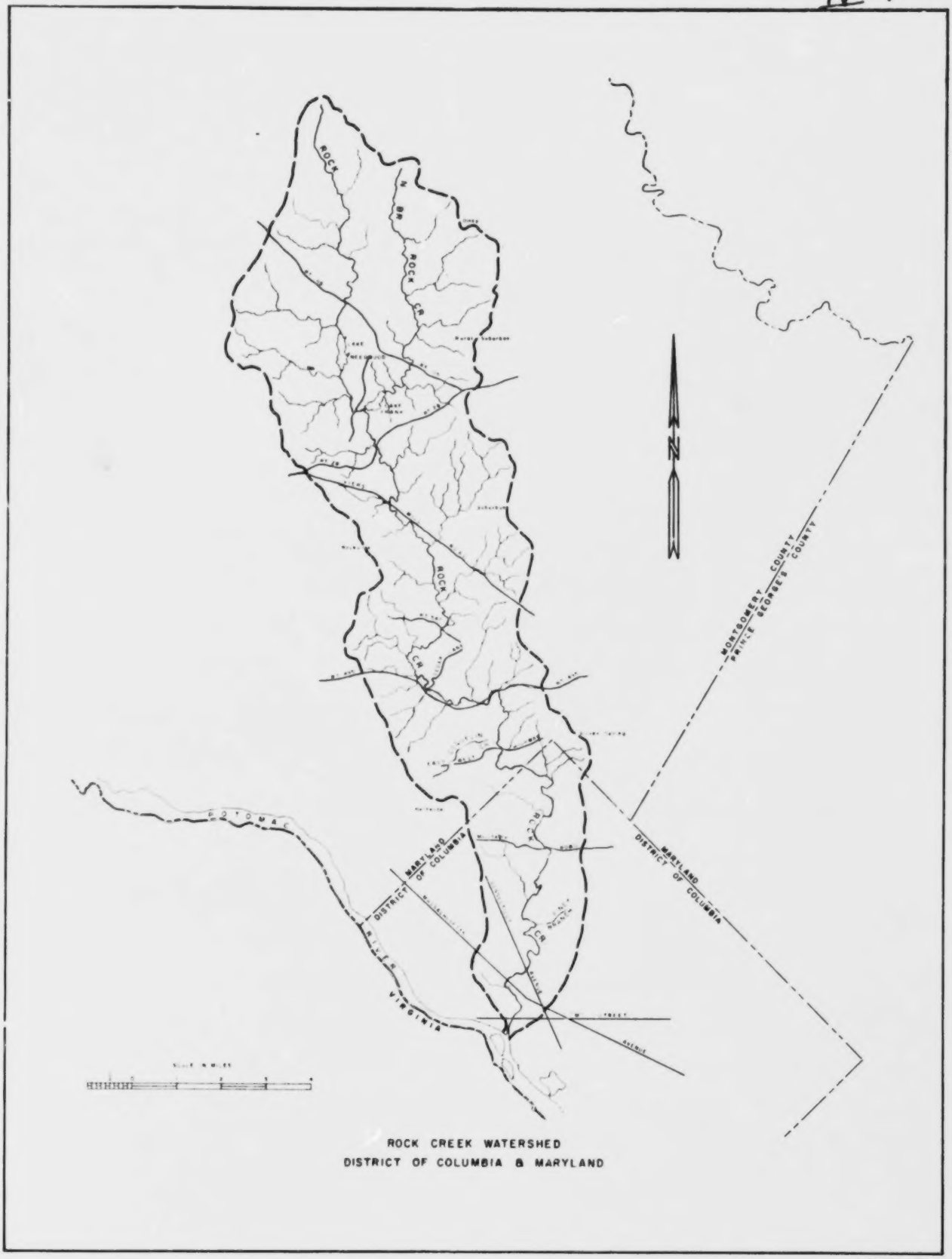
A. General Description

The Rock Creek watershed is located within the Washington, D. C. metropolitan area and has a population of about 430,000. Of the 77 square miles of drainage area, approximately 16 square miles lie within the highly urban District of Columbia with the remainder in Montgomery County, Maryland. (See Figure IV - 1.)

The Creek's channel follows a markedly meandering course and drops some 600 feet in elevation between its source in Maryland and its confluence with the Potomac River. There are frequent riffles, particularly in the District of Columbia between Military Road and Broad Branch.

In the upper portion of the basin in Maryland, which is in the Piedmont Physiographic Province, the watershed is predominantly rural in character, consisting of moderately well-drained rolling country. However, this rural dominance is rapidly diminishing as the suburban area pushes northward.

As the creek flows southerly into the District of Columbia, it traverses the Rock Creek National Park. Passing over numerous fords and flowing past the National Zoological Park, the waters of Rock Creek discharge into the Potomac Estuary just upstream from the Lincoln Memorial.



ROCK CREEK WATERSHED
DISTRICT OF COLUMBIA & MARYLAND

FIGURE IV - 1

B. Hydrology

Of the approximately 41 inches of precipitation falling annually on the watershed, about 11.5 inches run off as surface water. At the stream flow gauging station established in October 1929 near Sherrill Drive, the maximum, mean, and minimum discharges are 5,060, 55.3, and 1.5 cubic feet per second (cfs), respectively.

There are no consumptive surface water uses within the watershed. That is, all domestic and industrial water supply needs are supplied from the Potomac River, Patuxent River, and ground water sources.

C. Impoundments

As can be seen in Figure IV - 1, there are two stream impoundments in the Rock Creek watershed developed since 1966. The information on the two impoundments is presented in Table IV - 1.

TABLE IV - 1

ROCK CREEK IMPOUNDMENTS

Item	Unit	Lake Needwood (Site 5)	Lake Frank (Site 1)	Total
Drainage area	Square Miles	12.23	12.77	25.00
Sediment storage	Acre Feet	294	342	636
Flood water storage	" "	3,400	3,690	7,096
Recreation storage	" "	534	297	831
Total storage	" "	4,228	4,329	8,557
Recreation pool	Acres	74	54	128

The two impoundments, Lake Needwood and Lake Frank, were built initially for flood and sediment control as part of an overall watershed work plan[4] under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666). During the development of the plan, Public Law 566 was amended to provide for recreational developments. The cost allocation and cost sharing of the upper Rock Creek watershed development in Maryland is presented in Table IV - 2. This will be discussed in greater detail in Chapter VII.

D. Recreational Areas and Parks

Aside from providing a suburban environment, the water and land resources of Rock Creek offer an aesthetic pleasure to be derived from viewing the quietly flowing stream. As described in the publication "The Creek and the City,"[2] Rock Creek is a unique and well-beloved resource; moreover, "Picknickers gourmandize, painters paint, lovers love, and equestrians equitate even as Andrew Jackson did."

1. District of Columbia

In 1890, the Federal Government purchased most of the valley land of Rock Creek within the District for use as a park. The lower end of the watershed valley was purchased in 1913, connecting the park in Rock Creek with the system of parks along the Potomac River, now known as the Rock Creek and Potomac Parkway.

TABLE IV - 2

COST ALLOCATION AND COST SHARING SUMMARY
UPPER ROCK CREEK WATERSHED MARYLAND*

Dollars**

Item	Purpose			Total
	Flood Prevention	Recreation	Fish & Wildlife	
	COST ALLOCATION			
Multiple Purpose Structure Sites 1 & 5	1,221,648	132,729	-	1,354,377
Trout Stream Improvements	-	-	15,420	15,420
Basic Recreation Facilities	-	2,303,026	-	2,303,026
Total	1,221,648	2,435,755	15,420	3,672,823
	COST SHARING			
Public Law 566	722,571	660,301	200	1,383,072
Other	499,077	1,775,454	15,220	2,289,751
Total	1,221,648	2,435,755	15,420	3,672,823

*Taken from Reference 4.

**Actual cost incurred used for facilities installed
Price base 1966 for estimated costs.

Rock Creek Park, which encompasses some 1,754 acres in the District of Columbia, is managed by the National Park Service, U. S. Department of the Interior. (See Figure IV - 2.) During 1967, the following use was made of the park's facilities:

Area	Number of Visitors
Amphitheatre	180,000
Nature Study Area	120,000
Golf	80,000
Tennis	42,000
Stables	33,000
Pierce Mills	13,000

As presented in Table IV - 3, the use of the park facilities in the District of Columbia is projected to remain essentially constant, while use in Maryland is expected to increase by a factor of five by 1980.[4]

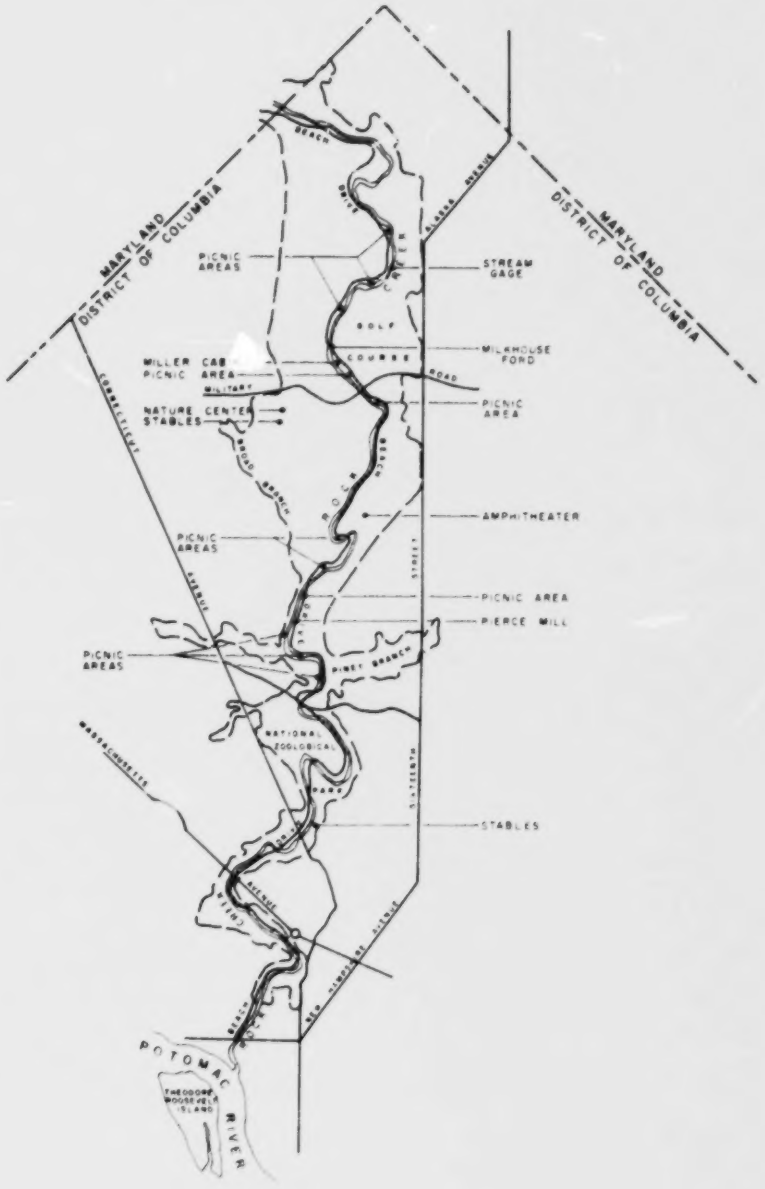
TABLE IV - 3

ANNUAL POPULATION USE OF ROCK CREEK PARK*

Item	District of Columbia	Maryland	Total
Use by permit (1960)	730,515	603,700	1,334,215
Total estimated use (1960)	1,812,000	1,500,000	3,312,000
Estimated use by permit (1980)**	730,515	3,150,500	3,881,015
Total estimated use (1980)**	1,812,000	7,815,000	9,627,000

*Taken from Appendix B of Reference 4.

**Estimate based on 1960 use rate with the proposed park facilities installed.



ROCK CREEK PARK — WASHINGTON, D.C.

SCALE IN FEET

5000 3000 1000 0 5000 8000 9000

FIGURE IV - 2

2. Montgomery County

Extending from the District of Columbia to the Rock Creek Regional Park at Lake Needwood and Lake Frank, there are a series of recreational areas (See Figure IV - 3). Development and maintenance of these areas, including the Rock Creek Regional Park, are the responsibility of the Maryland-National Capital Park and Planning Commission (MNCPPC).

Numerous expansions of the park facilities have been proposed by the MNCPPC. The expansions of the Rock Creek Regional Park are an integral part of the upper Rock Creek watershed work plan developed in 1962[4] by MNCPPC and Montgomery Soil Conservation District (MSCD).

In 1960, the use of these recreational facilities was slightly less than in the District of Columbia. However by 1980, this use is projected to increase more than fivefold, while the use in the District is projected to remain constant. During the summer season of 1968, there were more than 222,000 visitors to the recently opened Lake Needwood facilities alone. There are no facilities currently open to the public at Lake Frank.

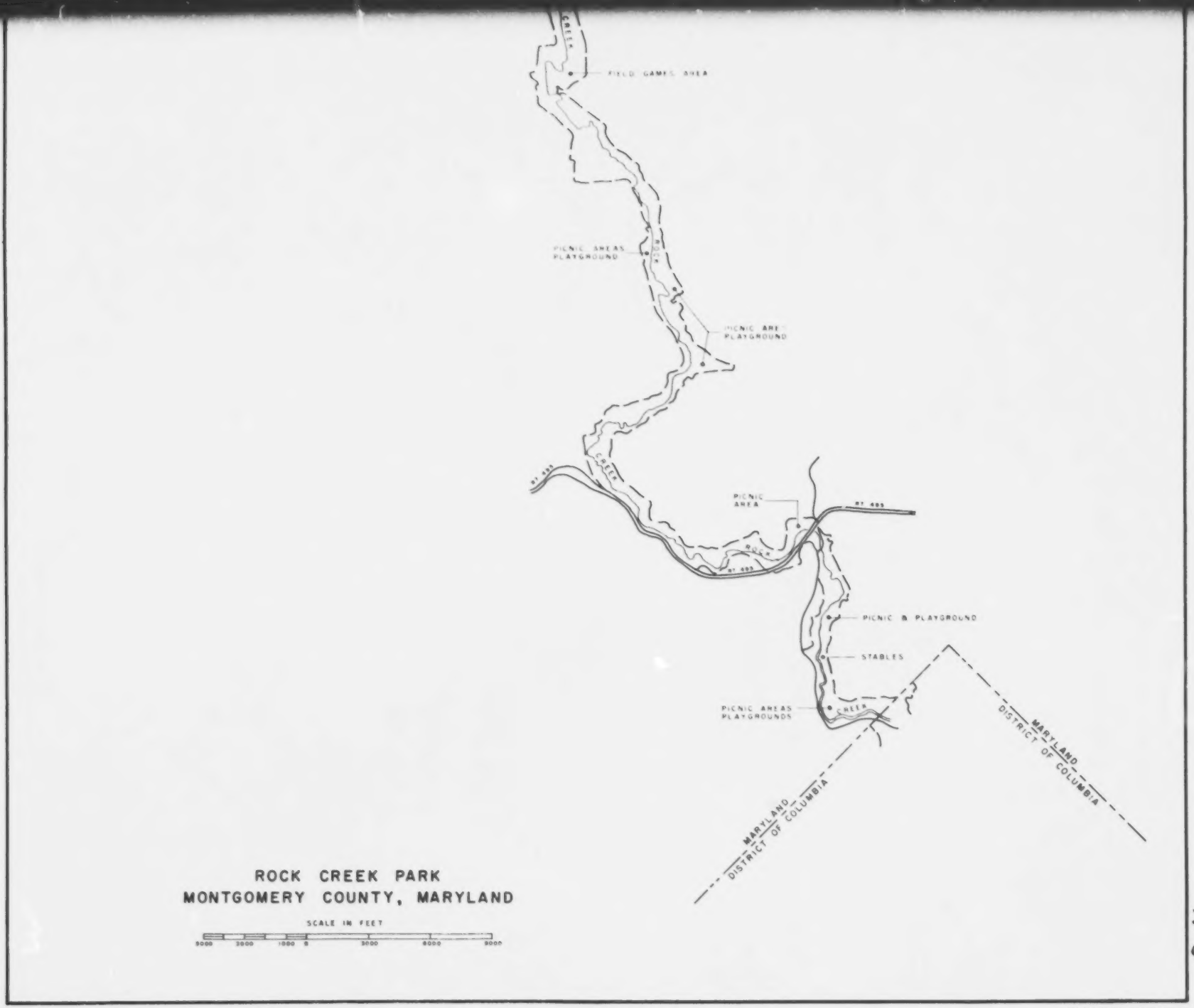
E. Fishing

Sport fishing in Rock Creek is generally restricted to the waters of the two impoundments and in the two-mile reach below each of the two impoundments. These reaches are maintained for trout

fishing only. The MNCPPC maintains a program of fish management jointly with the Maryland Department of Game and Inland Fish.

Fishing in these areas is on a "put and take" basis. Species such as bass, sunfish, catfish, and crappies are stocked each year in the impoundments, while trout are planted in the reaches below the dams.

PICNIC AREA
BOATING
FISHING
GOLF
COURSE
TROUT FISHING
FIELD GAMES AREA
PICNIC AREAS
PLAYGROUND
ROCK
CREEK
ROAD



ROCK CREEK PARK
MONTGOMERY COUNTY, MARYLAND

SCALE IN FEET

8-11

FIGURE IV - 3

CHAPTER V

WATER QUALITY STANDARDS AND IMPLEMENTATION PLANS

A. State of Maryland

In 1967, the State of Maryland*

> ". . . in order to provide for the enhancement of the water quality where such quality has deteriorated or is deteriorating, for the conservation of water quality where such quality is good or satisfactory, and for protection of lawful and reasonable uses . . ."

established both general and specific water quality standards for both inter- and intrastate waters. A plan for implementation and enforcement of the water quality standards for all of Maryland's waters was also established. The standards and the implementation plan for the interstate waters were approved and adopted by the Secretary of the Interior in August 1967.

The uses of waters were grouped into six categories as follows:

I - Shellfish harvesting

II - Public or Municipal water supply

III - Water contact recreation

IV - Propagation of fish and other aquatic life and wildlife

V - Agricultural water supply

VI - Industrial water supply

---

*Water Resources Regulation 4.8, General Water Quality Criteria and Specific Water Quality Standard for all Maryland Waters, Water Resources Commission and Department of Water Resources, Maryland State Office Building, Annapolis, Maryland 21401.

For each of the water use categories, maximum allowable values were established for dissolved oxygen, temperature, bacteria counts, and an allowable pH range was specified. The designated uses for applicable water zones of the Rock Creek watershed are presented below:

Water Zone	Water Use to be Protected
Headwaters, downstream to Lake Needwood (Site 5)	III, IV, V
From Norbeck Road (Rt. 28) upstream to Lake Needwood (Site 5) at dam	III, IV (trout), V
Upstream of Lake Frank (Site 1) Dam	III, IV (trout), V
Downstream from Norbeck Road (Rt. 28 to D. C. Line)	III, IV

For the reaches of Rock Creek within Maryland, the following criteria have been approved:

Parameter	Criteria	
	Trout Waters	Others
DO - mg/l, minimum	5.0	4.0
DO - mg/l, average	6.0	5.0
pH, range	6.0 - 8.5	6.0 - 8.5
Temp. ^{o}F, maximum	72	93
Fecal Coliform - MPN/100 ml, maximum	240	240

B. District of Columbia

The standards for interstate waters for the District of Columbia's Water Quality Criteria Implementation and Enforcement Plan were approved and adopted by the District of Columbia Commission sitting as a Board on June 29, 1967, amended September 28, 1967, and approved by the Secretary of the Interior on April 17, 1968.

The water uses of Rock Creek from the District Line to the Potomac River to be protected are:

1. Fish and wildlife propagation
2. Wading

For the reaches of Rock Creek within the District of Columbia the following criteria have been approved:

Parameter	Criteria
DO	Not less than 4.0 mg/l
pH	6.0 - 8.5
Temperature	Not to exceed natural conditions
Fecal coliform	Not to exceed 200 MPN/100 ml
Turbidity	Creek bottom to be visible in wading areas during wading season

CHAPTER VI

WASTEWATER CONVEYANCE AND DISPOSAL

Sanitary wastewater conveyance for the 430,000 inhabitants of the watershed is provided by the interconnecting sewerage systems of the Washington Suburban Sanitary Commission (WSSC) in Montgomery County and the Department of Sanitary Engineering of the District of Columbia. The wastewater is conveyed to the District of Columbia Water Pollution Control Plant at Blue Plains where it is treated (BOD removal about 70 percent) prior to discharge to the Potomac River.

A. Sewer System in the District of Columbia

The Rock Creek watershed in the District is served by two distinct types of sewerage systems: separate and combined. The separate systems consist of two entirely independent networks of sewers; one collects and conveys all domestic and industrial wastes to the treatment plant. The other network carries storm runoff to the nearest watercourse. The combined sewerage system receives domestic sewage and industrial wastes plus runoff from rainfall. The combined sewer interceptors along Rock Creek are designed for storm water flows between 30 and 200 times dry weather flow only; when rainfall exceeds this capacity, overflow occurs to Rock Creek.

Sanitary sewage from the seperately sewered area of D. C. plus that from Maryland is conveyed to the Potomac interceptors in an "express"

sewer (paralleling the combined sewer interceptors along Rock Creek) in order to avoid mixing with combined sewage. Overflow of sewage originating in separately sewered areas is thus minimized along Rock Creek and at the treatment plant and pumping station. A complete inventory of all discharges into Rock Creek, including combined and storm sewers was made by CFS in 1966. In the entire watershed there are about 211 outfalls as reported by the CFS.[1/]

In the District of Columbia portion of the Rock Creek watershed there are three parallel sanitary sewerage systems as presented in Table VI - 1. The wastewater flow for these systems is currently conveyed to the treatment facility via a common interceptor.

A study of sewer needs for the District of Columbia was completed in 1957.[7/] In this study the drainage area of combined and separate sewers was determined as reported in Table VI - 2. Of the 8,137 sewerable acres in the watershed, about 46 percent of the area was served by separate sewer systems.

TABLE VI - 1

SANITARY SEWERAGE SYSTEMS OF THE DISTRICT OF COLUMBIA IN THE ROCK CREEK WATERSHED

Service Areas of Rock Creek	Sewer System	Type of Sewer
Lower Western	West Rock Creek Diversion	Combined
Lower Eastern	East Rock Creek Diversion	Combined
Upper Western and Eastern (Including WSSC's area in Montgomery County)	Rock Creek Main Interceptor	Sanitary

TABLE VI - 2

DISTRICT OF COLUMBIA SEWERED AREAS
Rock Creek Watershed
1956

Sewer System	Separate (Acres)	Combined (Acres)	Sewerable (Acres)	Total (Acres)
West Rock Creek Diversion	20	351	371	480
East Rock Creek Diversion	62	3,438	3,499	3,855
Main Rock Creek Interceptor	3,675	601	4,276	6,511
Total	3,757	4,390	8,137	10,846

As recommended by the 1957 study, the District of Columbia has adopted "Project C" with a few modifications. Project C calls for the early construction of relief interceptors and pumping stations to relieve overflow and surcharge of sewers, including an extensive program of sewer separation. Progress in this program is discussed in Chapter VIII.

B. Sewer Systems in Montgomery County, Maryland

Of the approximately 61 square miles or 39,000 acres of the Rock Creek watershed in Maryland, all are served by the WSSC. Wastewater is also conveyed into the Rock Creek watershed sewer system by force mains from portions of the upper Patuxent and Muddy Branch sub-basins.

The sewers of WSSC in Maryland are separated. All domestic wastewater flow is by gravity, hence there are no pumping stations in the WSSC portion of systems.

Since there are no combined sewers in the Maryland portion of Rock Creek, all stormwater systems discharge directly into the surface waters of the watershed. Recently the Montgomery County Department of Public Works has assumed the responsibility for construction and maintenance of the stormwater drainage systems.

In 1967, the average wastewater flow from the entire system was about 20 mgd. On the basis of 120 gallons per capita per day, the current population served by the WSSC system is about 167,000.

CHAPTER VII

WATER QUALITY

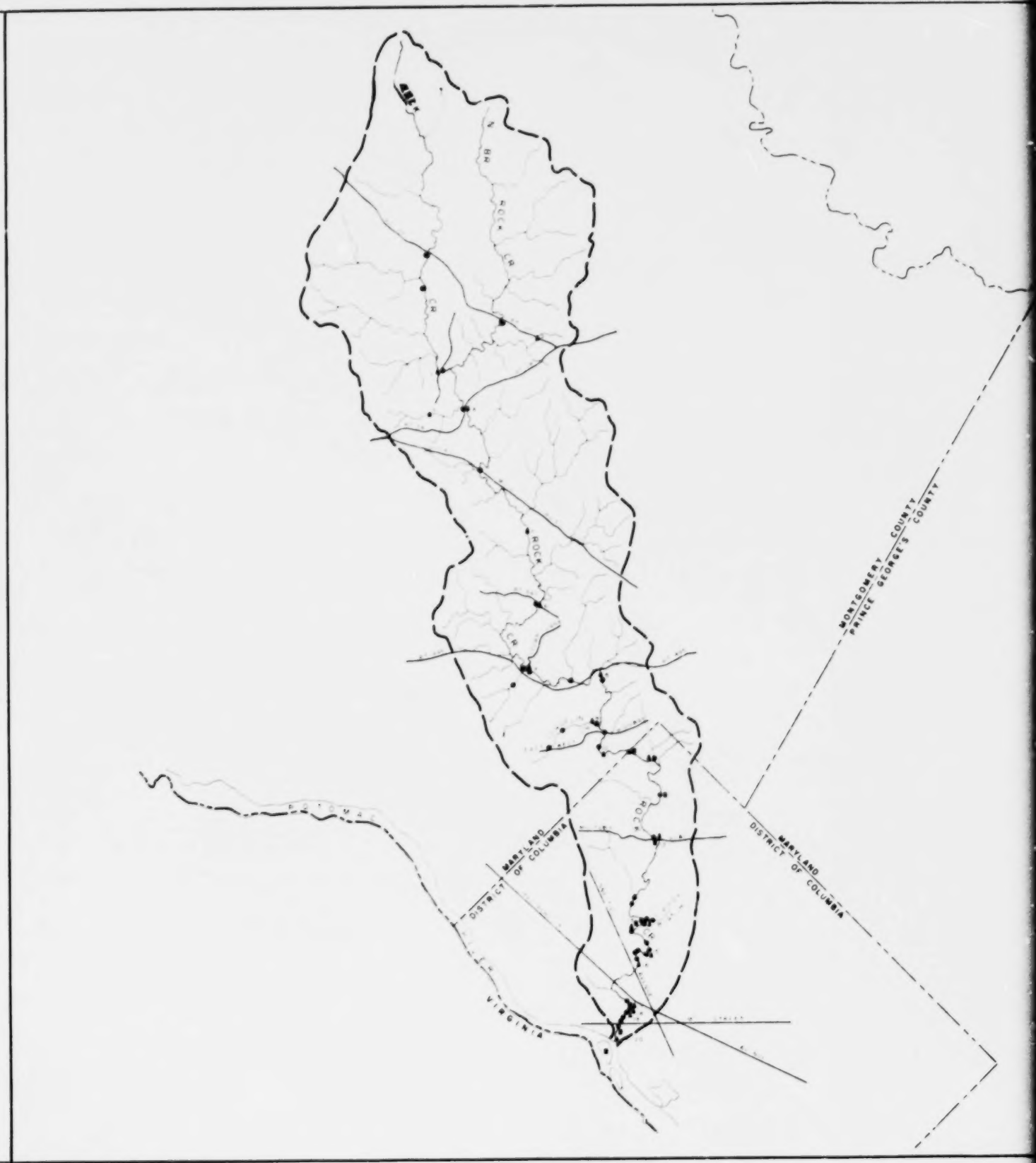
The water quality in Rock Creek has been routinely monitored by the Department of Public Health of the District of Columbia since the 1950's. In recent years stream surveys have been also conducted by the U. S. Geological Survey (USGS), the Chesapeake Field Station (CFS) of Federal Water Pollution Control Administration, and Maryland Department of Water Resources (MDWR). Data on water quality are also currently being collected by MNCPPC and Montgomery County Department of Health in the Lake Needwood area. Data on sediments and the rate of sedimentation in the upper watershed are also currently being taken by USGS and the Soil Conservation Service (SCS) of the U. S. Department of Agriculture. Location of some of the sampling stations is shown in Figure VII - 1.

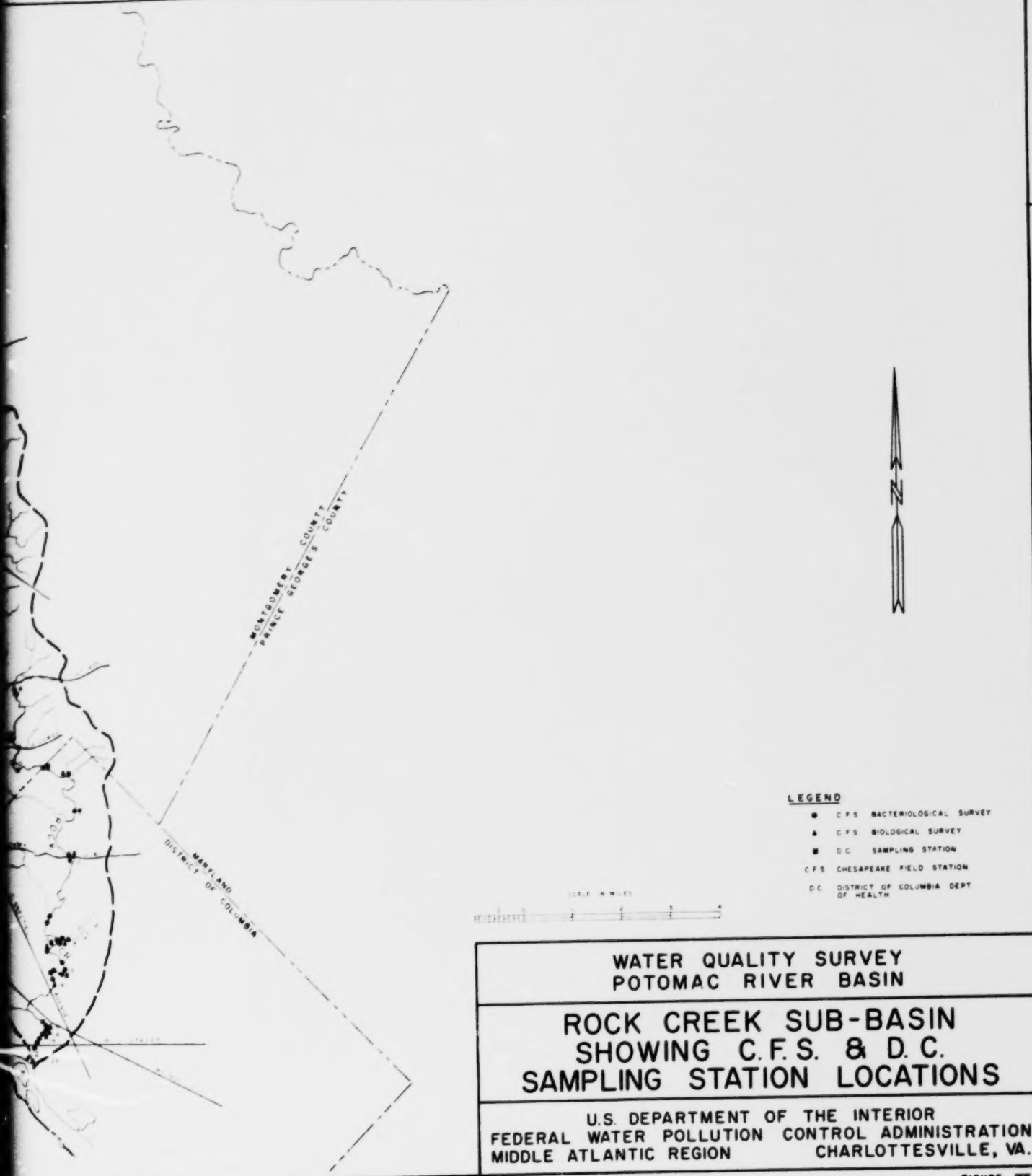
A. Biochemical Oxygen Demand and Dissolved Oxygen

1. Historical Trends

As indicated in Chapter VI there are no discharges to the surface waters from wastewater treatment facilities in Rock Creek watershed other than temporary facilities at the Zoo. The major source of organic pollution appears to be from a combination of urban runoff, agricultural drainage and, to a lesser extent, overflowing and defective sewers.

Figure VII - 2 shows the yearly average BOD concentrations for the reach of Rock Creek within the District of Columbia from 1960 through 1967. The average annual BOD at the District Line ranged from 2.4 to


ROCK CR
ROCK CR
ROCK CR
ROCK CR
POTOMAC R
MONTGOMERY COUNTY
PRINCE GEORGE'S COUNTY
MARYLAND
DISTRICT OF COLUMBIA
MARYLAND
DISTRICT OF COLUMBIA
VIRGINIA



WATER QUALITY SURVEY
POTOMAC RIVER BASIN

ROCK CREEK SUB-BASIN SHOWING C.F.S. & D.C. SAMPLING STATION LOCATIONS

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.

FIGURE VII-1

TRENDS OF BIOCHEMICAL OXYGEN DEMAND
ROCK CREEK

Adapted from INCOPOT
1960-1967

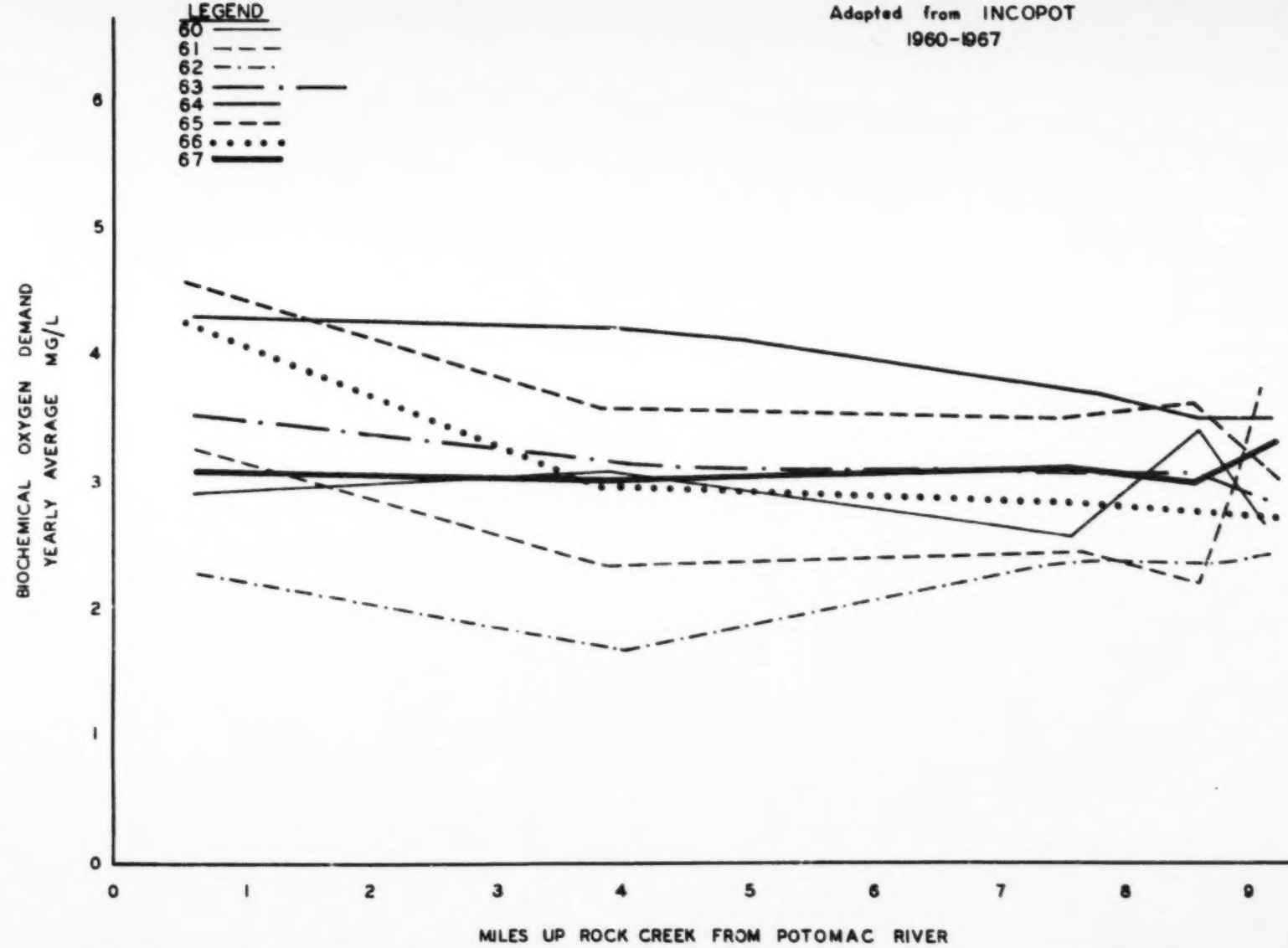


FIG. XII - 2

3.8 mg/l. At the station 0.9 miles from the Potomac Estuary, the range was slightly higher, 2.2 to 4.6 mg/l.

A summary of the monthly average DO for the sampling stations in the District of Columbia from 1960 through 1967 is exhibited in Table VII - 1. The monthly averages for July, August, and September for this period were all above 5.0 mg/l. In fact, most of the monthly averages were above 7.0 mg/l or more than 90 percent of saturation.

There appears to be no significant increase or decrease in BOD or DO between the District Line and the confluence with the Potomac River. Furthermore, there appears to be no significant change from 1960 to 1968.

2. Spatial Distribution

Based on the surveys in 1966 by the USGS and by the CFS and MDWR in 1968, as presented in Tables VII - 2, VII - 3, and VII - 4, respectively, the spatial distribution of BOD appears to be fairly uniform throughout the watershed except in the upper portions. This distribution indicates that there is no single principal source of BOD in the watershed.

Preliminary analysis of the water quality data being collected by MNCPPC below Lake Needwood indicates that DO in the trout area ranged generally from 4.0 to 5.0 mg/l during the summer months of 1968. In Lake Needwood the data indicate that there is significant stratification with little or no DO in the deeper areas of the impoundment. Outflow from Lake Needwood is usually at a depth of 10 feet, but multiple outlets permit varying of depth to supply water of optimum DO and temperature for downstream needs.

TABLE VII - 1

SUMMARY OF AVERAGE MONTHLY DISSOLVED OXYGEN CONCENTRATIONS
Rock Creek
D. C. Department of Public Health

Year	Dissolved Oxygen (mg/l)				
	Pennsylvania Avenue	Park Road	Military Road	Sherrill Drive	D. C. Line
1962					
July	7.6	8.4	7.5	8.2	7.6
August	8.4	8.8	9.0	7.8	6.8
September	8.0	8.8	7.9	8.7	7.6
1963					
July	8.5	8.8	9.4	7.9	9.2
August	7.3	9.1	8.3	7.8	7.8
September	8.5	9.1	8.8	7.9	8.3
1964					
July	7.5	8.6	8.1	7.7	7.5
August	8.4	9.4	9.1	8.3	8.2
September	7.6	9.4	9.0	7.8	7.9
1965					
July	7.8	7.8	8.6	8.8	7.8
August	6.9	7.9	6.3	5.9	5.5
September	8.3	9.4	8.6	8.1	7.4
1966					
July	6.5	8.9	8.7	7.9	7.3
August	7.6	9.6	8.7	7.9	7.6
September	8.2	9.3	8.1	7.7	8.1
1967					
July	8.0	8.0	8.0	8.0	8.0
August	9.0	8.0	7.0	7.0	7.0
September	9.0	10.0	9.0	9.0	9.0

B. Bacteriological

1. Trends

Historically, in the waters of Rock Creek very high coliform counts have been observed, as can be seen in Figure VII - 3, for the station at the District Line (mile 9.1) and the one at Park Road (mile 3.9). The mean monthly coliform counts for the years 1963 through 1967 were principally in the range of 10,000 to 100,000 MPN/100 ml. Since 1966, fecal coliform densities have also been determined. Historically, there appears to be no significant trend in coliform densities at these stations, but there appears to be a slight increase since 1966.

2. Spatial Distribution

As can be seen in Figure VII - 3, there was a slight increase in coliform densities from Station 1 at the District Line to Station 4 (Park Street), for 1963-67 period. During a four-day study in August of 1967 by the Chesapeake Field Station, there was about a three-to fivefold increase in both coliform and fecal coliform densities within the District (See Table VII - 4).

The highest increases in both densities were observed in the creek above the National Zoological Park. These high counts were probably a result of sewage overflows into Piney Branch, a tributary to Rock Creek. The densities below the Zoo were considerably lower, indicating that no significant pollution was entering the creek from the Zoo.

During 1968, fecal coliform densities ranged from 360 MPN/100 ml

VII - 4-a

COLIFORM TRENDS
MONTHLY MEANS
ROCK CREEK
1963-1967

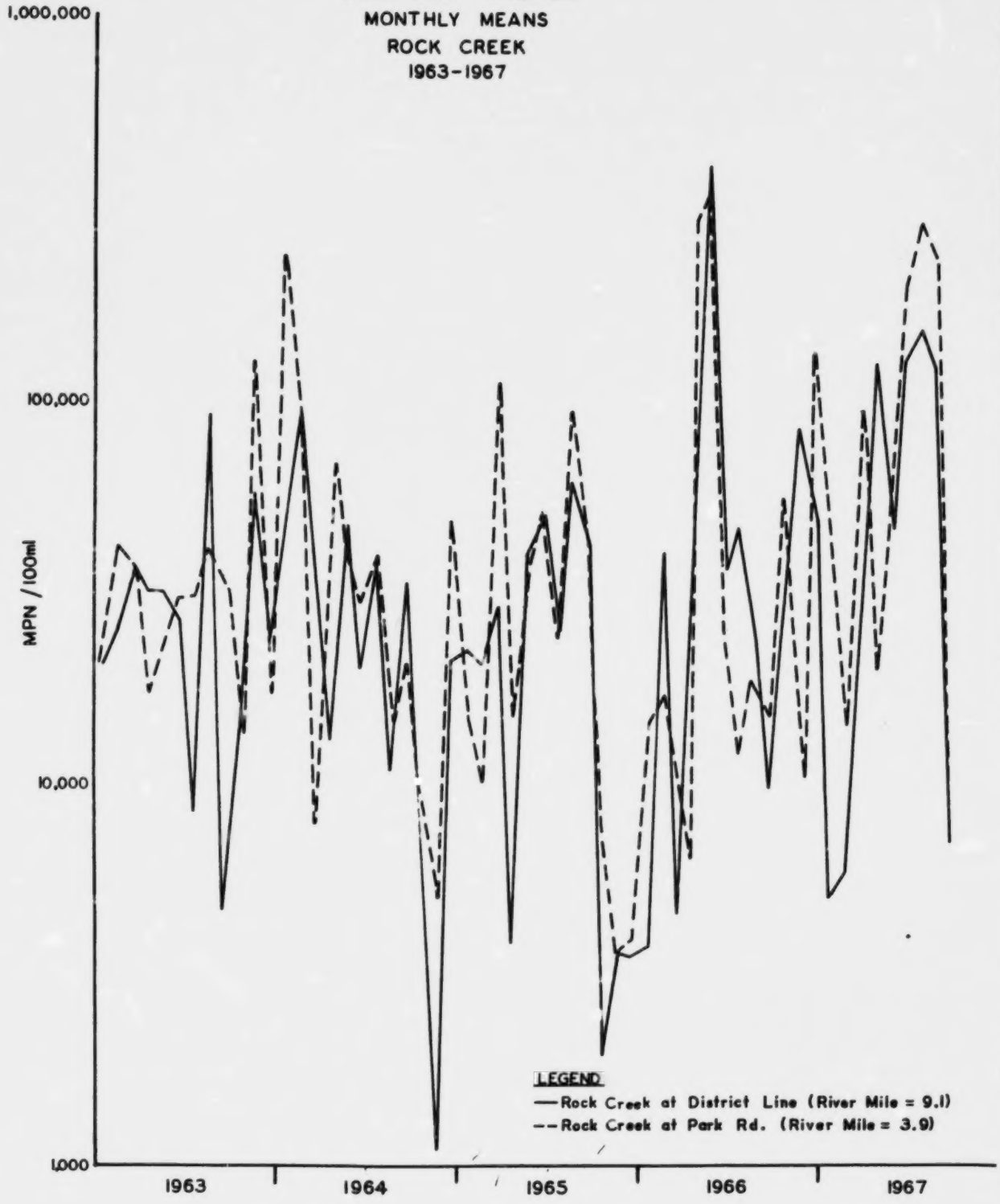


FIG. VII - 3

TABLE VII - 2

WATER QUALITY RECONNAISSANCE
Rock Creek
USGS
July 26 - 27, 1966

Station	Drainage Area (sq. mi.)	Flow (cfs)	Temp. (°C)	DO (mg/l)	Coliform (MPN/100 ml)	BOD (mg/l)
Avery Road	18	1.0	23.0	7.0	12,400	5.0
Highway 28	33	1.9	23.5	5.5	15,400	5.3
Viers Mill Road	38	3.5	24.0	7.5	18,500	2.7
Randolph Road	43	6.0	24.2	7.2	28,000	1.9
Knowles Avenue	48	6.8	26.5	8.3	23,000	2.1
Milkhouse Ford	64	7.5	27.0	10.0	25,000	3.2
Pierce Mill	69	8.0	26.8	10.0	51,000	2.6
Below Piney Branch	73	8.1	26.5	10.3	29,400	2.7
Connecticut Avenue	74	8.2	29.5	8.6	42,000	2.5
"Q" Street	76	8.3	25.2	7.3	28,800	1.9
Potomac Marina	--	--	28.0	6.0	57,000	2.6

TABLE VII - 3

ROCK CREEK WATER QUALITY SURVEY
September 9, 1968
Chesapeake Field Station

Sampling Location	River Miles	Water Temp. (°C)	T. PO_4 as PO_4 (mg/l)	TKN (mg/l)	NO_2+NO_3 as N (mg/l)	Turb. (JTU)	DO (mg/l)	BOD (mg/l)	Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml
Pennsylvania Ave.	0.4	19	.211	.611	.435	28	8.60	2.26	9,300	750
Park Road	3.9	18.6	.157	.503	.590	20	9.10	2.62	9,300	2,300
Military Road	8.1	18	.175	.377	.759	18	8.30	3.10	24,000	930
Sherrill Road	9.1	18	.331	.431	.516	41	7.70	2.12	9,300	4,300
Jones Mill Road	12.3	19.5	.173	.377	.524	12	8.43	2.20	9,300	430
Viers Mill Road	21.2	19	.164	.635	.680	19	7.69	2.30	24,000	1,500
Norbeck Road Rt. 28	23.1	19	.191	.275	.708	28	7.41	2.24	9,300	930
Redland Rt. 115 (Main Stem)	27.0	17	.121	.186	1.405	20	9.38	2.10	4,300	930
Norbeck Road Rt. 115 (North Branch)	25.9	17.5	.113	.257	.711	34	8.56	1.96	2,300	150

TABLE VII - 4

WATER QUALITY DATA
Rock Creek
April 16 - 17, 1968
Maryland Department of Water Resources

Station	Water Temp. (°C)	Susp. Solids (mg/l)	DO (mg/l)	BOD (mg/l)	Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)	NO_3 as N (mg/l)	PO_4 as PO_4 (mg/l)
Avery Road	12.6	17	13 0	6.6	23,000	9,300	0.65	0.40
Route 28	14.2	24	12.1	2.0	210,000	43,000	0.20	0.20
Gaynor Road	15.0	7	12.9	1.5	9,300	430	0.30	0.15
Route 547	15.0	40	14.1	3.8	430,000	430,000	0.55	0.40
Cedar Lane	13.5	15	13.0	2.6	9,300	430	0.75	0.15
Jones Mill Road	18.5	33	14.5	2.8	9,300	230	0.05	0.40
East-West Highway	17.5	58	12.0	3.1	4,300	430	0.75	0.70
Beech Drive	11.6	28	9.4	0.5	75	3*	0.05	0.45
Military Road	14.5	39	10.5	-	3,900	23	0.20	0.55
Park Road	14.5	37	11.0	1.4	23,000	93	0.05	0.45
Harvard Street	13.6	26	9.6	1.5	430	3*	0.10	0.85
Calvert Street	16.0	36	10.5	1.0	43,000	150	0.20	1.60

*Less than.

to over 10,000 MPN/100 ml at the D. C.-Maryland Line (See Figure VII - 4). These densities are considerably higher than the fecal coliform standard for both the District of Columbia and the State of Maryland.

For the April survey of MDWR, the higher fecal coliform densities were observed in the upper portion of the watershed (See Table VII - 4). These high densities and higher BOD's indicate that a significant amount of organic pollution is coming from both urban and agricultural runoff.

During the September 9, 1968 survey, high coliform densities were observed at all stations within the watershed, including those in Montgomery County, Maryland. Except for stations on the North Branch, all had fecal coliform counts greater than the adopted standard of 240 MPN/100 ml. The largest increase in fecal coliform was observed between Jones Mill Road and the D. C. Line in Montgomery County and between Sherrill Road and Military Road within the District of Columbia (See Table VII - 3). Fecal coliform counts in the 1966 survey (Table VII - 6) were somewhat lower than those of 1967 and 1968.

During periods of high runoff, high suspended solids and BOD's are frequently observed. These observations indicate that there is a "flushing" of the watershed during periods of heavy precipitation resulting in increased concentrations of suspended solids, BOD, and coliform counts.

C. Nutrients

In 1966, the CFS conducted a study of the nutrient loadings in the entire Potomac River system, including a station in Rock

FECAL COLIFORM DENSITIES

Rock Creek at District Line

1968

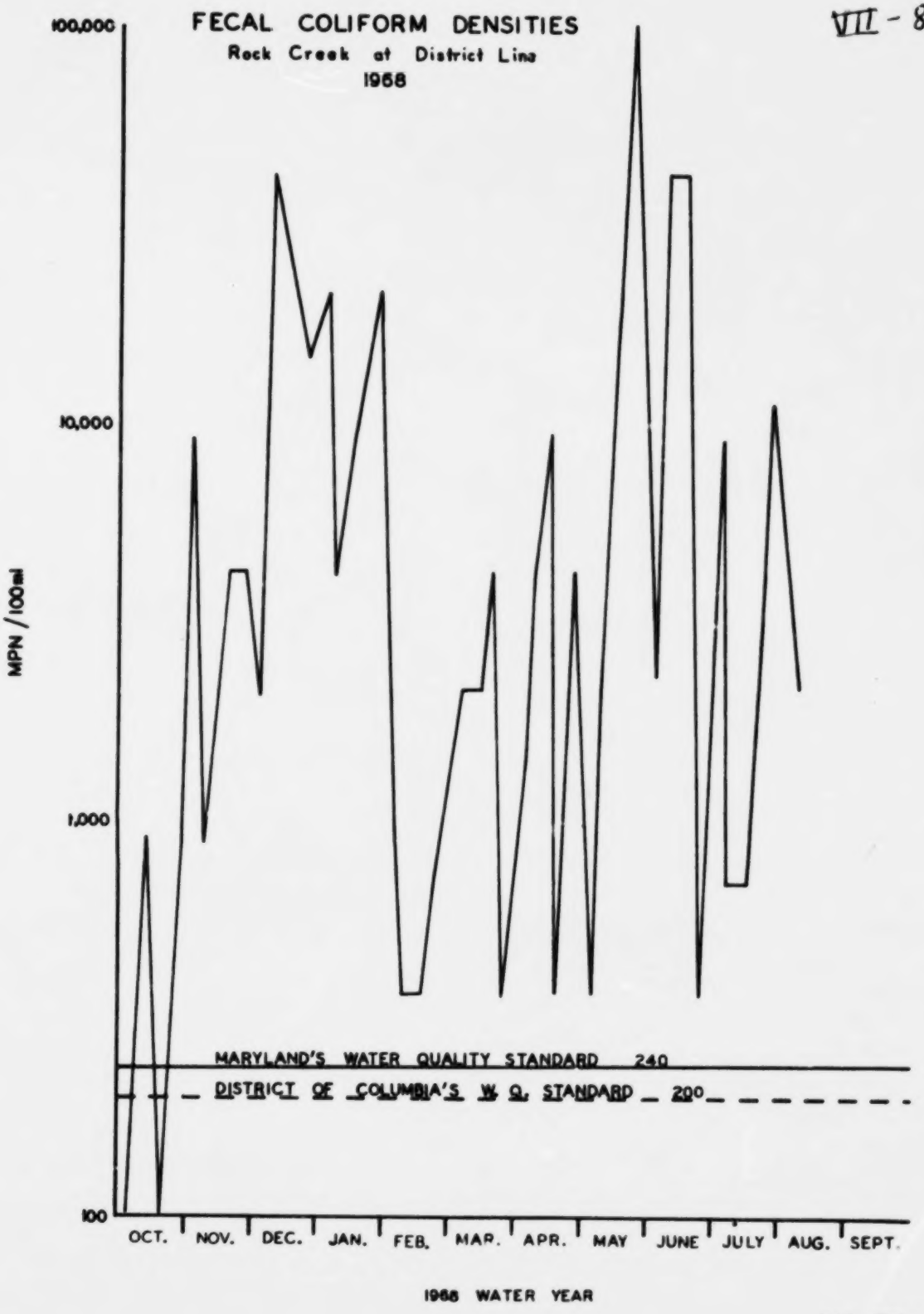


FIG VII - 4

TABLE VII - 5

ROCK CREEK SURVEY
August 15 - 18, 1967
Chesapeake Field Station

Date	Station	Turbidity (JTU)	Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)
8-15	"M" Street Bridge	6.0	9,180	9,180
8-15	Above "P" Street Bridge	7.5	5,420	3,480
8-15	Mass. Ave. Bridge	13.5	9,180	5,420
8-15	Ford Above Zoo	9.0	34,800	34,800
8-15	Porter Street	9.6	10,900	7,000
8-15	Blagden Rd. Branch	4.0	10,900	3,480
8-15	Military Road	13.7	3,480	1,720
8-15	Sherrill Drive	13.5	7,000	3,480
8-15	D. C. Line	11.0	3,480	790
8-15	Cedar Lane	13.5	2,400	790
8-16	"M" Street Bridge	7.5	16,090	3,480
8-16	Above "P" Street Bridge	7.5	5,420	2,400
8-16	Mass. Ave. Bridge	11.0	3,480	3,480
8-16	Ford Above Zoo	6.0	34,800	34,800
8-16	Porter Street	7.0	3,480	1,720
8-16	Blagden Rd. Branch	1.0	2,210	490
8-16	Military Road	12.0	3,480	790
8-16	Sherrill Drive	11.0	9,180	1,720
8-16	D. C. Line	11.0	3,480	1,300
8-16	Cedar Lane	12.0	5,420	1,720

TABLE VII - 5 (Continued)

Date	Station	Turbidity (JTU)	Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)
8-17	"M" Street Bridge	6.5	16,090	5,420
8-17	Above "P" Street Bridge	7.0	16,090	5,420
8-17	Mass. Ave. Bridge	11.0	17,200	2,100
8-17	Ford Above Zoo	5.5	16,090	16,090
8-17	Porter Street	6.8	5,420	1,090
8-17	Blagden Road Bridge	0.5	3,480	790
8-17	Military Road	12.0	24,000	1,090
8-17	Sherrill Drive	10.5	16,090	2,210
8-17	D. C. Line	6.5	3,480	1,090
8-17	Cedar Lane	10.0	2,210	1,090
8-18	"M" Street Bridge	7.0	10,900	4,600
8-18	Above "P" Street Bridge	5.0	3,480	700
8-18	Mass. Ave. Bridge	7.0	8,400	910
8-18	Ford Above Zoo	6.0	54,200	17,200
8-18	Porter Street	6.5	3,480	1,090
8-18	Blagden Road Bridge	1.0	1,410	330
8-18	Military Road	8.0	16,090	5,420
8-18	Sherrill Drive	8.0	24,000	9,180
8-18	D. C. Line	7.0	2,400	1,300
8-18	Cedar Lane	10.5	5,420	700

TABLE VII - 6

SUMMARY OF BACTERIOLOGICAL DATA
Rock Creek
June-August 1966
Chesapeake Field Station

Sample Location	Miles from Potomac River Confluence	Number of Samples	Coliforms (MPN/100 ml)	Fecal Coliforms (MPN/100 ml)	Fecal Streptococci (MPN/100 ml)
Muncaster Road Rt. 115	28.8	2	3,350	1,850	1,140
Needwood Road	27.3	1	1,300	330	93
Avery Road	23.8	2	1,100	110	250
Norbeck Road Rt. 28	23.1	1	460	210	130
Viers Mill Road	21.2	2	1,020	315	150
Knowles Avenue Rt. 547	17.3	1	2,400	1,300	330
Cedar Lane	14.8	7	26,500	1,740	1,980
NMC - Bethesda	14.6	1	2,400	61	20
Kensington Avenue	13.5	1	9,200	260	110
East-West Highway	11.1	5	58,400	2,570	8,190

TABLE VII - 7

SUMMARY OF NUTRIENT DATA
Rock Creek and "M" Street Bridge
Chesapeake Field Station
1966

Month	Total Phosphate (PO_4)		NO_2-NO_3 as N	
	(mg/l)	(lb/day)	(mg/l)	(lb/day)
January	0.26	21	0.95	80
February	0.47	290	1.22	740
March	0.23	40	0.99	200
April	0.28	180	0.65	340
May	0.34	140	0.85	290
June	0.62	120	1.32	80
July	0.55	51	0.87	25
August	0.21	5	0.56	15
September	0.40	145	0.80	290
October	0.16	30	0.71	165
November	0.17	20	0.57	75
December	0.20	40	1.10	255
Average	0.32	90	0.88	212

Creek at "M" Street. The results of weekly sampling program, as presented in Table VII - 7, show that the average phosphorus and inorganic nitrogen concentrations were 0.32 and 0.88 mg/l of PO_4 and N, respectively.

The highest monthly loadings of nutrients were observed in February of 1966, at which time about 290 lb/day of phosphorus and 740 lb/day of inorganic nitrogen were measured in Rock Creek at the "M" Street station while in August, the loading was 5 and 15 lb/day, respectively. February was the highest flow month of 1966, August the driest.

The data from the 1968 survey of the CFS and MDWR, as presented in Table VII - 3 and VII - 4, indicate that the nutrient concentrations are fairly uniform throughout the watershed. The Kjeldahl nitrogen concentrations for the CFS survey appear to increase in the downstream stations, however the increase is not too significant.

As with BOD, the nutrient loadings appear to originate from urban and agricultural runoff. The annual average yield to the watershed is about 1.2 and 2.8 lb/day/sq. mile of phosphorus and inorganic nitrogen, respectively, in contrast to the upper Potomac River Basin, which has yields of 1.48 and 4.29 lb/day/sq. mile, respectively.

D. Suspended Solids (Sediments)

As indicated in the section of this chapter on BOD and DO, the amount of suspended solids in Rock Creek at the D. C. Line is

TABLE VII - 8

AVERAGE MONTHLY SUSPENDED SOLIDS LOADINGS
Rock Creek at District Line
1966 Water Year

Month	Average Monthly* Flow (cfs)	Suspended Solids (mg/l)	Suspended Solids (lb/day)
October	49	10	2,610
November	11	3	1,610
December	14	14	1,050
January	24	64	8,200
February	104	29	16,300
March	49	10	2,620
April	65	14	4,850
May	59	30	9,400
June	29	20	3,100
July	17	21	1,920
August	9	19	910
September	128	62	53,500
Monthly Average	46	24	8,840

*Flow for Rock Creek at Sherrill Drive

a function of the rainfall intensity and resulting runoff. In 1966, the highest suspended solids loadings were observed during the months of February and September. These were also the two high flow months of the 1966 water year (See Table VII - 8).

The average suspended solids in 1966, a low flow year, was 24 mg/l as compared to 46 mg/l for 1967, which was an average stream flow year. At times Rock Creek is best described as "chocolate" in appearance. In 1967, about 15 percent of the time the suspended solids concentration was greater than 100 mg/l.

From 1964 to mid 1968, there appears to be no significant increase or decrease in suspended solids observed at the District Line (See Figure VII - 5). Since Lake Frank was just recently completed, the effect of the two impoundments on the sediment control program cannot be made at this time.

E. Surfactants

A limited number of surfactant determinations were made by the CFS and the FWPCA Research Laboratory at the Blue Plains facilities in Washington, D. C., for two creek surveys in June and one in October of 1966. The October survey followed a report of extensive foaming.

The average surfactant concentrations for June 21 and 22 and individual values for the two other surveys are presented in Table VII - 9. With one exception, the surfactant concentrations

VII-15-a

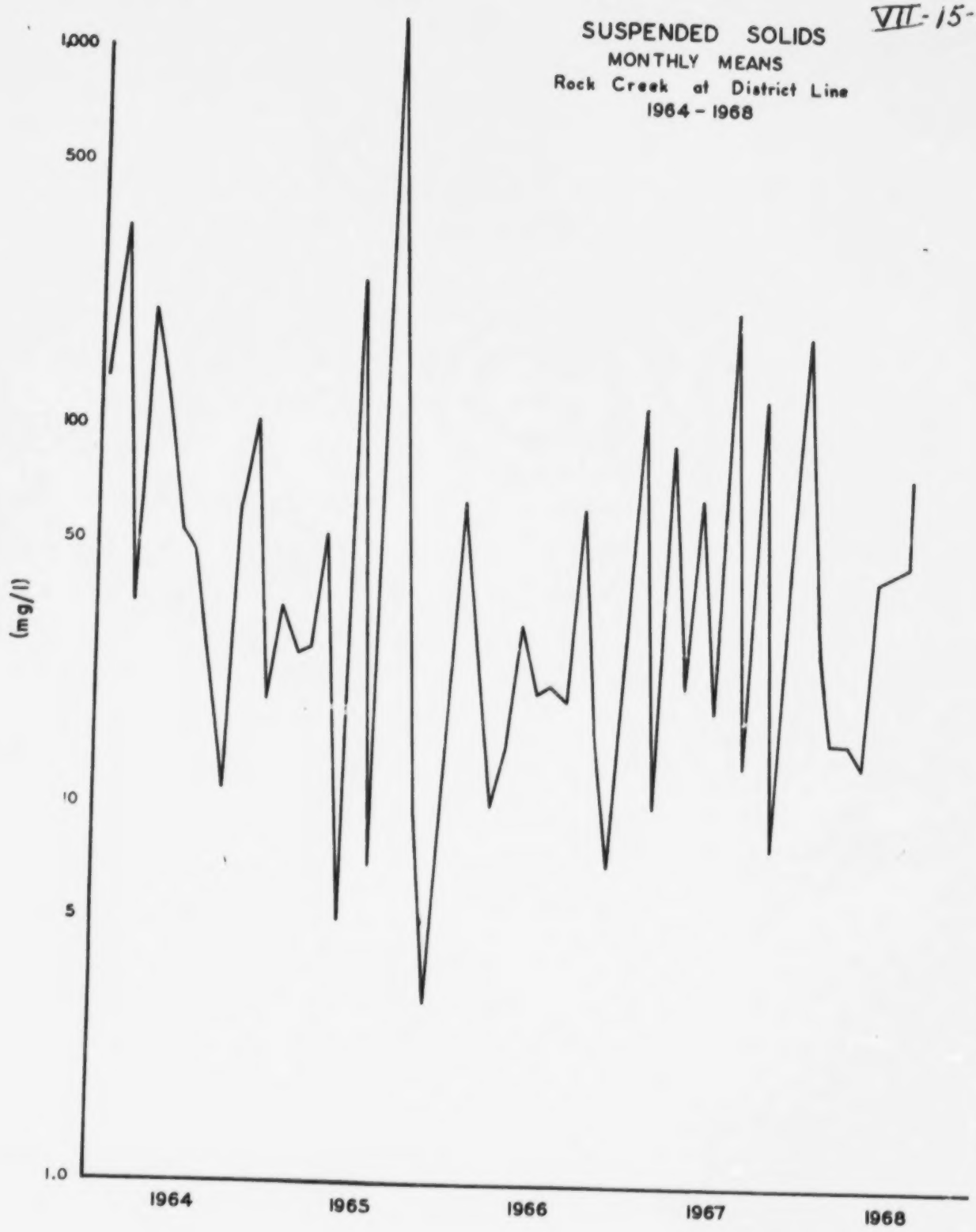


FIG. VII - 5

TABLE VII - 9

SURFACTANT ANALYSES OF ROCK CREEK

1966

Sample Location	Miles from Potomac River Confluence	Surfactant Concentration (mg/l)		
		June 21 and 22	June 29	October 18
M Street Bridge	0.4	0.112	0.673	0.255
Massachusetts Avenue Bridge	1.0	-	-	0.255
Ford below the National Zoological Park	2.7	0.030	-	-
100 yards above Rock Creek - Piney Branch Confluence	4.2	-	-	0.249
Pool above Pierce Mill Park Road	4.7	0.042	-	0.377
Military Road	6.8	0.052	-	0.232
Sherrill Drive at Picnic Area	8.1	0.064	0.173	-
District Line Bridge	10.0	0.067	0.316	0.102
East-West Highway	11.1	0.051	-	-
Cedar Lane	14.8	0.047	0.164	0.046
Viers Mill Road	21.2	0.033	-	-
Avery Road	23.8	0.031	-	-

were significantly less than 1 mg/l* of ABS. The limited data indicate that foaming resulting from surfactants is not a continuous water quality problem. Moreover, if foaming does occur, it is apparently caused by intermittent discharges.

In 1967 and 1968, there were no reported incidents of foaming. This was probably due to the replacement of ABS by biodegradable ingredients in household detergents.

F. Biological Life

Biological surveys of Rock Creek and its tributaries were conducted in August 1966[3] and in February 1967. Investigations were made at 16 stations on Rock Creek and at four stations on the tributaries.

Using bottom organisms as a primary indicator of biological water quality, the following were observed:

1. From Avery, Maryland, to the small tributary east of Rockville, Maryland, numerous minnows and clean-water bottom organisms were observed indicating good water quality. From the tributary to Viers Mill Village, some degradation of water quality was noted, but indicated water quality was generally good.

2. Intermediate aquatic life was observed at Viers Mill Village, indicating fair water quality.

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*The criterion for foaming is 1 mg/l.

3. Clean water aquatic life, indicating good water quality, was found from Garret Park, Maryland, to North Chevy Chase, Maryland.

4. Evidence of pollution increased in the lower portion of the watershed. Sparse clean-water genera at Rock Creek Recreation Center indicated fair water quality, while intermediate and pollution-tolerant genera in the reach from Beach Drive to "P" Street indicated mild pollution.

5. Slash Run and "P" Street outfall sewers were contributing organic pollution to Rock Creek. Moderate to heavy pollution was indicated from "P" Street to the Potomac River. Dominant bottom organisms consisted of intermediate and pollution-tolerant genera. Only one bottom organism was found at the mouth of Rock Creek.

In general, the bottom organisms indicate better aquatic environment in Rock Creek above the Interstate 495 Beltway than in the lower portion of the basin.

The biological survey in February of 1967 indicated that the pollutional status of Rock Creek remained essentially unchanged from that of August 1966.

CHAPTER VIII

POLLUTION ABATEMENT ACTIVITIES AND PROGRAMS

A. Wastewater Conveyance and Disposal

1. District of Columbia

The sewerage systems of the Rock Creek watershed consist of two independent systems as described in Chapter VI. Above Piney Branch (four miles above the mouth), the sanitary sewage and the storm sewage are separated. The sanitary system which serves the District of Columbia above Piney Branch plus portions of Montgomery County is carried to the Potomac Pumping Station in the main Rock Creek interceptor, an "express" sewer which is kept independent of the combined system. This sewer will handle twice the average annual flow.

Older sections of the city including the Piney Branch tributary area and areas to the South are on a combined sewer system. The combined sewer systems connect to their own interceptors along Rock Creek. These interceptors are designed to handle from 30 to 200 times normal dry weather flow. When rainfall exceeds these limits, overflow to Rock Creek occurs.

Separation of the old system is underway, but progress is slow due to the magnitude of expenditures required. Separation may not be the best solution as untreated urban stormwater also contributes to pollution. In the past two years, separation has been carried out in the Klingle Creek (277 acres) and Normanstone (241 acres) areas. Separation is also carried out in urban renewal areas. Table VIII - 1 shows present status of acreage connected to each system.

TABLE VIII - 1

DISTRICT OF COLUMBIA SEWERED AREAS

ROCK CREEK WATERSHED

1968

Sewer System	Separate (Acres)	Combined (Acres)	Sewerable (Acres)
West Rock Creek Diversion	20	351	371
East Rock Creek Diversion	62	2,920	2,982*
Main Rock Creek Interceptor	4,763	31	4,794*
Total	4,845	3,302	8,147*

*Some of the acreage in the East Rock Creek Diversion as presented in Table VI - 1 is now connected to the Main Rock Creek Interceptor.

The principal problem at the present time is the overflow of the Rock Creek Sewers below "P" Street (one mile above mouth). The two force mains along the Potomac, which are to carry the flows from the two sewer systems previously described, are not yet completed around the Lincoln Memorial due to delays in final location of freeways. Design of the mains is now complete and ready for bids; construction should be completed in 24 months. The force mains are to be installed deep enough to avoid conflict with future freeway construction.

Meanwhile sewage from Rock Creek is conveyed to the treatment plant by an overloaded interceptor in Constitution Avenue. This sewer is surcharged to such an extent that dry weather flows often overflow to Rock Creek below "P" Street. Discharge from water cooled air conditioners contribute to this problem. Upon completion of the Potomac force mains and addition of two pumps to the station at Roosevelt Bridge, only flows above 30 times dry weather will overflow to Rock Creek; however, the pumping station will handle only five times dry weather with the remainder going to the Potomac River.

Coliform counts below "P" Street should improve following this construction. Above "P" Street little improvement can be expected until methods of handling of urban runoff have been developed.

In September 1968, the D. C. Department of Sanitary Engineering conducted a field inspection of outlets along the Creek. This resulted in correction of several sewer leaks, and recommendations for cleaning storm drain outlets and repair of end walls.

2. National Zoological Park

The sewers serving the National Zoological Park are divided into four separate systems. Sanitary sewage from toilet facilities and drainage from animal cages are discharged to the main Rock Creek interceptor sewer.

The runoff from animal pens and outdoor exhibit areas, which formerly discharged to Rock Creek, is now conveyed to holding tanks which discharge gradually (maximum rate 10 cfs) to the D. C. combined

interceptor system. The initial runoff from rain falling in the exhibit areas will be conveyed to the holding tanks; however, any rainfall in excess of a storm to be expected once in six months will bypass to the storm sewers.

The overflows from the wet moats and waterfowl ponds is eventually to be filtered and recirculated. Pending completion of the rebuilding programs at the Zoo, some of this water is now discharged either to the sanitary sewers or to Rock Creek following temporary treatment.

The storm sewers are used for the relatively uncontaminated runoff from the park and picnic areas, roof drains, and roads.

The program for improvements in the Zoo sewer system is now about 80 percent completed, and no major wastes are now discharged untreated to Rock Creek, except wastes from outdoor animal pens following a heavy rainfall.

3. Montgomery County

The WSSC has a five-year program for sanitary sewer expansion including the facilities in Rock Creek watershed. The program calls for expansion of the system in Crabbs Branch, Rockville, Olney, and Brookville areas. The storm sewer system is now the responsibility of the Montgomery Department of Public Works.

A program of sewer maintenance and inspection is also an integral part of WSSC's program. Immediately preceding the joint inspection of all outfalls in 1966 by WSSC and FWPCA personnel, WSSC conducted a two-month intensive program of sewer inspection and repair, especially in the Coquelin Creek area.

As a routine part of the maintenance and inspection program, all trunk sewers are inspected and cleaned monthly. In general, it appears that the frequency of sewer overflow from structural failure is very small when compared to failures caused by vandalism. This is especially pronounced in park and recreational areas.

B. Debris Removal and General Sanitation

Trash and debris in the Creek and along its banks detract from the scenic beauty of the Creek. During the summer of 1968, the Park Service together with FWPCA, the Army Corps of Engineers, and D. C. Government embarked on a major cleanup effort using young workers hired for the summer. Results were good, but each new minor flood brought a new supply of debris downstream. According to the Park Service, the cleanup will continue on a more limited basis using regular employees.

The Park Service has considered the installation of chlorination facilities to make Lower Rock Creek safer for wading. Studies showed, however, that chlorine demand would be high during the periods of high turbidity following each rain, so the project has been deferred.

C. Sediment Control Program

1. Sediment Control

As indicated in Chapter IV, a comprehensive sediment control program in Montgomery County is currently in effect. Administered by the Montgomery County Department of Public Works, with assistance

by the WSSC, the Soil Conservation Service, Forest Service, MNCPPC, and Montgomery Soil Conservation District, the compulsory program is to provide for the control of soil erosion, particularly in the developing areas of the county.

The program includes practical combinations of the following technical principles which will provide effective sediment control when skillfully planned and applied:

a. The smallest practicable area of land should be exposed at any one time during development.

b. When the land is disturbed, the exposure of soil should be kept to the shortest practicable period of time.

c. Temporary vegetation and/or mulching should be used to protect critical areas exposed during development.

d. Sediment basins (debris basins, desilting basins, or silt traps) should be installed and maintained to remove sediment from runoff waters from land undergoing development.

e. Provisions should be made to accommodate effectively the increased runoff caused by changed soil and surface conditions during and after development.

f. The permanent final vegetation and structures should be installed as soon as practicable in the development.

g. The development plan should be fitted to the topography and soils so as to create the least erosion potential.

2. Sediment Removal

In addition to the preventive program as outlined in the previous paragraph, one of the main functions of the two impoundments is that of sediment trapping. Preliminary analyses indicate that the two impoundments are capable of removing about 80 percent of the incoming sediment load.

The impoundments and land treatment are designed to reduce the flood water damage by 62 percent and reduce by 51 percent the sediments delivered to the Potomac River by Rock Creek. The structures are capable of handling all storms which have a frequency equal to less than once-in-10-years.

3. Lake Needwood Project

A research project by Dow Chemical[5] is currently being sponsored by MNCPPC to determine if it is possible to increase the efficiency of Lake Needwood in removing sediment by the addition of flocculents and determine if it has any beneficial effect on the water and aesthetics in the impoundment. Based on studies made in 1967, the cost of the silt control by flocculents is $5.43 per acre foot of water treated. The FWPCA and Soil Conservation Service are assisting in this project.

4. Hydrologic and Sedimentation Studies

A ten-year study is currently being conducted by the SCS and USGS "to develop, adapt, and evaluate conservation practices and engineering design procedures to alleviate and to minimize the impact

of urbanization on sediment and runoff production and transport, and to improve and to modify sedimentation and hydrologic prediction procedures on watershed areas being converted from rural to urban areas."

"The scope of study will include making detailed measurements of sediment load and runoff and interpretation of the data at several locations in Rock Creek and Anacostia River Basins in Montgomery County, and developing and evaluating conservation measures and engineering procedures which will effectively reduce sediment and runoff production."

Information from this study will be extremely valuable in evaluating the sediment control program in the Rock Creek watershed. Progress reports will be prepared periodically by the SCS.

D. Research and Development Programs

Rock Creek has been selected by the FWPCA as the location for two research projects. A contract was recently negotiated with the Dow Chemical Company for a pilot program of sediment control. A site was selected on Rock Creek in late 1968, and a pilot plant will be constructed. Tentative location is near the D. C.-Maryland Line. Chlorination equipment will also be included in addition to the coagulation and sedimentation facility.

On June 29, 1968, the FWPCA entered into a contract with Roy F. Weston, Inc., to evaluate methods for abating pollution from combined sewer discharges. Overflows from sewers in the vicinity of 26th and "O" Streets, N. W., will be monitored and their effect of water quality determined.

Alternate methods for handling these overflows are to be evaluated. Some of the methods include underground storage, high rate filtration, flocculation, separation of combined sewers, and modifications to convey and treat entire flows at the present treatment plant site. Preliminary plans and specifications are to be drawn up and cost estimates given. Completion date for this project is July 1969.

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